is damaged by stress caused by fatigue, the connection line **20** may be substantially prevented from being shorted. That is, since the connection line **20** includes two paths about the opening **50***e* due to the guard pattern **52***e* that surrounds the opening **50***e*, even when one path is damaged, the connection line **20** may be substantially prevented from being shorted due to the other path, thereby improving the reliability of the electronic apparatus **1** including the PCB **10***o*.

[0177] FIG. **17** is a plan view illustrating essential parts of a PCB **10***p* according to an example embodiment.

[0178] Referring to FIG. **17**, the PCB **10***p* includes the base substrate **12** and the connection line **20** formed on the base substrate **12**. The base substrate **12** included in the PCB **10***p* may include the bending region BR having both edges **12**E and the mounting regions DR extending from both ends of the bending region BR.

[0179] The base substrate **12** may include an opening **50***f* formed in the bending region BR. The opening **50***f* may be formed in the connection line **20**. The opening **50***f* may be formed in each or at least one of a plurality of the connection lines **20**. A plurality of the openings **50***f* may be arranged to form a line along each or at least one of the connection lines **20** in the bending region BR. One of the plurality of openings **50***f* arranged to form the line along the connection line **20** may be located on the virtual bending central line BC that connects both edges **12**E of the bending region BR,

[0180] The PCB **10***p* is similar to or the same as the PCB **10***o* of FIG. **16** except that the opening **50***f* formed in the connection line **20** is similar to or the same as the opening **50***c* formed in the outer connection line **20***o* of FIG. **14**, and thus a detailed explanation thereof will not be given. That is, a width of the opening **50***f* located on the virtual bending central line BC from among the plurality of openings **50***f* formed in the connection line **20** may be the largest.

[0181] In the PCB **10***p* according to the example embodiment, cracks may be substantially prevented from propagating due to the opening **50***f*. Even when a portion of the connection line **20** that is disposed in the bending region BR is damaged by stress caused by fatigue, the connection line **20** may be substantially prevented from being shorted. That is, since the connection line **20** includes two paths about the opening **50***f* due to a guard pattern **52***f* that surrounds the opening **50***f*, even when one path is damaged, the connection line **20** may be substantially prevented from being shorted due to the other path, thereby improving the reliability of the electronic apparatus **1** including the PCB **10***p*.

[0182] Although the openings **30***a*, **30***b*, **30***c*, **30***d*, **30***e*, **30***f*, **30***g*, **40***a*, **40***b*, **40***c*, **40***d*, **40***e*, **40***f*, and **40***g* are each formed in a portion of the base substrate **12** on which the connection line **20** is not formed in FIGS. **2** through **11** whereas the openings **50***a*, **50***b*, **50***c*, **50***d*, **50***e*, and **50***f* are formed in the connection line **20** in FIGS. **12** through **17**, any combination may be made. That is, a PCB including at least one of the openings **30***a*, **30***b*, **30***c*, **30***d*, **30***e*, **30***f*, **30***g*, **40***a*, **40***b*, **40***c*, **40***d*, **40***e*, **40***f*, and **40***g* of FIGS. **2** through **11** and at least one of the openings **50***a*, **50***b*, **50***c*, **50***d*, **50***e*, and **50***f* of FIGS. **12** through **17** may be provided without departing from the scope of the inventive concepts.

[0183] FIGS. **18**A through **18**F are cross-sectional views each illustrating essential parts of a PCB included in the electronic apparatus **1** of FIG. **1**. In particular, FIGS. **18**A through **18**F are cross-sectional views illustrating portions of a PCB corresponding to the openings **30***a*, **30***b*, **30***c*, **30***d*, **30***e*, **30***f*, **30***g*, **40***a*, **40***b*, **40***c*, **40***d*, **40***e*, **40***f*, **40***g*, **50***a*, **50***b*, **50***c*, **50***d*, **50***e*, and **50***f* of FIGS. **2** through **17**. In FIGS. **18**A through **18**F, the same elements as those described above are denoted by the same reference numerals, and a repeated explanation thereof will not be given.

[0184] FIG. **18**A is a partial enlarged cross-sectional view of a PCB **10-1** according to an example embodiment.

[0185] Referring to FIG. **18**A, the PCB **10-1** includes the base substrate **12** including an opening **60***a*. A guard pattern **62***a* may be formed along a boundary of the opening **60***a* on each or at least one of a top surface **12***a* and a bottom surface **12***b* of the base substrate **12**. The guard pattern **62***a* may have a substantially constant width along the boundary of the opening **60***a*. A width of the guard pattern **62***a* formed on the top surface **12***a* of the base substrate **12** and a width of the guard pattern **62***a* formed on the bottom surface **12***b* of the base substrate **12** may be substantially equal to each other.

[0186] The PCB **10-1** may further include a cover layer **14** that is an insulating layer and is formed on each or at least one of the top surface **12***a* and the bottom surface **12***b* of the base substrate **12**. The cover layer **14** may cover the guard pattern **62***a* formed on the top surface **12***a* and the guard pattern **62***a* formed on the bottom surface **12***b* of the base substrate **12**.

[0187] The cover layer **14** may be formed of or include, for example, a PI film, a PET film, a flexible solder mask, a PIC, or a photo-imageable solder resist. The cover layer **14** may be formed, for example, by directly coating the base substrate **12** with thermosetting ink by using silk-screen printing or inkjet printing and then performing thermal curing. The cover layer **14** may be formed, for example, by entirely coating the base substrate **12** with a photo-imageable solder resist by using screen printing or spray coating, removing a unnecessary portion through exposure and development, and then performing thermal curing. The cover layer **14** may be formed, for example, by laminating a PI film or a PET film onto the base substrate **12**.

[0188] FIG. **18**B is a partial enlarged cross-sectional view of a PCB **10-2** according to an example embodiment.

[0189] Referring to FIG. **18**B, the PCB **10-2** includes the base substrate **12** including an opening **60***b*. A guard pattern **62***b* may be formed along a boundary of the opening **60***b* on each or at least one of the top surface **12***a* and the bottom surface **12***b* of the base substrate **12**. The guard pattern **62***b* may have a substantially constant width along the boundary of the opening **60***b*. A width of the guard pattern **62***b* formed on the top surface of the base substrate **12** and a width of the guard pattern **62***b* formed on the bottom surface **12***b* may be substantially equal to each other.

[0190] A side wall pattern **64***b* that conformably covers an inner side wall of the opening **60***b* may be formed in the opening **60***b*. The side wall pattern **64***b* may be formed of or include, for example, copper or a copper alloy. The side wall pattern **64***b* may be formed, for example, by using electroplating or electroless plating. The side wall pattern **64***b* may substantially prevent cracks from occurring and propagating in the base substrate **12**.

[0191] Although not shown, a side wall pattern that conformably covers a side wall of each or at least one of openings **60***c*, **60***d*, **60***e*, and **60***f* of FIGS. **18**C through **18**F may be further formed in each or at least one of the openings **60***c*, **60***d*, **60***e*, and **60***f*.

[0192] FIG. **18**C is a partial enlarged cross-sectional view of a PCB **10-3** according to an example embodiment.